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of its own too powerful feudatory, and accepted by the Irish, as the only means of obtaining that security which the English Sovereign was powerless to afford.

The truth, is, however, that we are not left to inference or conjecture in this question. The Reports on the condition of Ireland in the State Papers of the period abound in evidence confirmatory of the view which I have given; and it is far from improbable that, in the muniment-rooms of Kilkenny or Portumna Castle, covenants of the Earls of Ormond and Ossory or Clanrickard with the Irish may yet be discovered, of the same, or similar import with that which has formed the subject of this discussion. The system of exactions which prevailed on the part of the Anglo-Irish nobles is fully described in these Reports; and it was not confined to the Geraldines alone. I referred in my former Paper to certain "Articles and Instructions" to "our Soweraine Lord the King for his land of Ireland," drawn up in 1538, which expressly declare that the major part of the Irish chiefs "bere grete trubut," not only to the Earl of Kildare, but to the Earls of Desmond and Ossory. The same articles contain a similar allegation as to the "Earl of Shrowisbury, within the countie of Wexford," adding, that, in consequence, His Grace the King "out of that countie hath not one peny of revenuse, except the poundage of the town of Wexford."

Nor need we seek for any evidence of the magnitude of this evil in the eyes of the author of this Report, beyond the recommendation which his Report embodies, that "the Erle of Kildare, and the Erle of Ossory, be both heyr before your Grace; they to be examinyd what trubut they haiv of your Irish rebels; whereby it shall apeyr unto your Grace, as well the *gret sumys of goodes that they haiv of them*, as the bandes and allyaunce which every of them hath with Irish men."

LV.—ON THE "FÖHN" OF THE ALPS AND ITS CONNEXION WITH THE GLACIER THEORIES. BY PROFESSOR HENNESSY, F. R. S.

[Read May 24, 1869.]

THE warm southerly wind known to the inhabitants of the valleys of the Swiss Alps as the "Föhn," has lately attracted much attention from geologists as well as physical inquirers. Those who maintain the far greater development of glaciers at epochs not long anterior to the historical epoch, as compared to their present number and extent, appeal to the Föhn, as the principal agent for reducing the glacial masses to their present condition. They have endeavoured to show that the Föhn is of recent origin, and that its existence depends essentially on that of the great African desert, the Sahara. Here a meteorological question arises—namely, does the Föhn actually come from the Sahara, or from any other source? To this question several eminent meteorologists have already given replies, but I may be still permitted to state the independent conclusions which were suggested to me from circumstances which fell under my own observation when in Switzerland in 1867.

When the Föhn rushes into the central and northern Alpine valleys it has generally been observed as a dry, warm wind, and it is this peculiar dryness which first suggested its desert origin. This dryness of the air in the valleys is, however, by no means universal; and it is always accompanied by falls of rain and snow on the mountains, subsequently followed by moist precipitations in the valleys themselves. Hence it follows, that the Föhn, when first impinging on the mass of the Alps, is not a dry, but a moist wind. The first portions of the aërial current of which it is composed, having been stripped of their moisture, by condensation and precipitation among the higher summits and ridges, descend in a dry state into the Alpine valleys. Together with its moisture, it has lost heat when expanding in traversing the summits of the mountains; but on descending to the lower valleys, it is again compressed, and thus gives out sensible heat, and becomes known as a warm as well as a dry wind. This explanation of its physical characters seems to be generally admitted among the meterologists who have most carefully studied the phenomenon. The next question that arises is, whether it is probable that warm currents of air derived from the Sahara, or from some other southerly source, would follow the precise direction required for sweeping over the Alps. The condition of the Sahara as an originator of warm aërial currents is one essentially connected with the diurnal fluctuation of temperature.* By day its surface acquires intense heat, the greater part of which it loses by radiation during the night. We should thus expect *à priori*, that its disturbing influence on the atmosphere should be fluctuating and violent, rather than extensive, such as might accompany a more constant source of heat. Moreover, the column of heated air rising upwards from the heated soil of the Sahara, and tending to flow meridionally northwards, owing to the earth's rotation, would be gradually deflected, and move towards the north-east, so as to blow towards Turkey, Asia Minor, and the Black Sea, rather than Switzerland.

The general direction of the Föhn points to an origin west of the Sahara, in the Atlantic Ocean, off the coast of Morocco. This part of the Atlantic is traversed by a branch of the great north-western equatorial thermal current, of which another branch strikes our shores. The bifurcation occurs south of the Azores, and one portion proceeds towards the north-west coast of Africa and south-west coast of Europe. In order to determine whether the Föhn originates from the Atlantic or the Sahara, a careful tracing out of its passage over intermediate countries must be made; and this has been in a great measure effected by Professor Wild, of St. Petersburg; Professor Dufour, of Lausanne; Dr. Hann, and other metereologists. M. Wild concludes that every time an equatorial cyclone arrives in Europe from the coast of Ireland, along the Bay of Biscay through Spain to the Mediterranean, there is a Föhn in the Alps. If the equatorial storms attack the coast of Ireland, the Föhn commences in West Switzerland with its usual accompaniments. M. Wild finally concludes that the Föhn has no direct relation with the Sahara, and that it arises from the ordinary moist equatorial currents of air coming from the Atlantic.

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* See "On the Temperature of the Lower Regions of the Earth's Atmosphere," "Transactions," vol. xxiv., pp. 402, 408.

These results came under my notice for the first time in several essays contained in the "Archives des Sciences Physiques et Naturelles," of Geneva, for the past and present year, 1868 and 1869; and they have induced me to refer to the conclusions to which I had been previously led from independent study of the phenomena. In 1864, when listening to Sir Charles-Lyell delivering his address to the British Association at Bath, I was impressed with the belief that the distinguished geologist had entirely misinterpreted the phenomenon of the Föhn with reference to the extension and diminution of glaciers, and in a communication to the geological section I alluded to the subject.

Subsequently, in 1867, I had an opportunity of witnessing one of the less intense currents of air which the peasants of the Oberland and Valais call a Föhn, and which assisted in establishing in my mind the true solution of the question.

I spent the night of the 3rd of September, 1867, at Guttanen, in the Hasli-thal, a place well known to be within the district where the Föhn is frequent. The night was still and warm, while the sky was nearly cloudless. On the morning of the 4th, while descending the valley towards Im-Grund, the wind commenced blowing with considerable force from the south-south-west; the sky was clear, and the warmth of both sun and air so great, that I screened myself with a sunshade. My guide cried out, "Das Föhn," and directed me to instantly fold up the umbrella, and look to my steps so as to avoid the danger of being blown from the narrow pathway. The few clouds scattered over the sky were not at this time in rapid motion, and it seemed manifest that the violence of the wind was in part due to the shape of the valley. At first the wind was dry and very hot; but the clouds continued to gather rapidly, while the air grew appreciably more damp and warm. In a short time the weather presented precisely the same appearances as those with which we are familiar in Ireland when the wind blows strongly from the south-west. Towards evening, when I arrived at Interlacken, the force of the wind had greatly lessened; but the sky was completely covered with clouds, and rain fell abundantly during the night.

On the 5th, when passing over the Lake of Thun, I noticed that all the hills and mountains were closely enveloped in mist and rain, in the same manner as the hills of Cork and Kerry during southerly winds. Except at its commencement, this specimen of the Föhn appeared to be quite the reverse of a dry parching wind.

In the records of meteorological observations, printed in the "Archives des Sciences," I find noted under the 4th of September, at Geneva—dew in the morning, haze all the forenoon; the barometer fell 2.$^{\text{mil.}}$ 74 between the 3rd and 4th, and the temperature rose by 0·42 C.; prevailing wind, south-south-west. At the Great St. Bernard's—mist, morning and evening of the 4th. In the night, between the 3rd and 4th, a thunderstorm with rain; barometer fell 2 millimetres. The highest temperature of the month was on the 3rd, 11° 24 C.; prevailing wind south-west.

If the phenomena which came under my notice could be considered as representing the phenomena of the Föhn, I could not avoid concluding that this wind was essentially similar to our south-west Atlantic winds, and my subsequent perusal of the various essays on the subject in the "Archives des Sciences" rendered this conclusion unquestionable.

In recent times it has become the fashion among a great number of geologists to ascribe to ice the principal agency in modifying the features of the earth's surface. Glaciers are invoked to perform every kind of denuding work, from the transport of a grain of sand to the rounding, rending, and sculpturing of mountain masses. At the present day, in Switzerland and Savoy, this work is partly performed by atmospheric action, gravity, and the moving force of water both in its liquid and solid state. In order that water should operate almost exclusively in the solid state, the glaciers must have had, according to glacialists, a much greater extension during comparatively recent geological epochs than at present. The necessity for appealing to cosmical changes was supposed to be obviated by the theory of the Föhn, which ascribes to this wind an African desert origin. Evidence has been put forward to show that the Sahara was submerged up to a comparatively recent date, and hence it was concluded that during the period of its submergence no Föhn could have existed. To the warm breath of Föhn is attributed the retrogression of the glaciers to their present positions and dimensions.

But if the Föhn is proved to have no connexion with the great African desert, this theory of the regression of Alpine glaciers must be abandoned.

LVI.—Report on the Researches of Herr Cohnheim on Inflammation and Suppuration.

By J. M. Purser, M. B.

[Read July 12, 1869.]

The researches of Professor Cohnheim on suppuration are of great importance, and have excited a very unusual amount of interest. The corpuscles of pus have long been acknowledged by microscopists to be morphologically indistinguishable from the white cells of the blood; but they were supposed to originate either by proliferation of the cells of the inflamed part, or to arise spontaneously in a formative fluid or blastema poured out from the blood. The point of Cohnheim's theory